AMENDMENTS UNDER ARTICLE 34

CLAIMS

1. (Amended) A method for adjusting a recording condition of optical information, comprising the steps of: irradiating an optical recording medium with laser light having a recording pulse waveform generated based on a recording signal, which is in synchrony with clock cycles, to form a record mark group on said optical recording medium; reading said record mark group to obtain a reproduced waveform, and adjusting the recording condition by sampling said reproduced waveform at a period shorter than a clock period to evaluate a linearity of said reproduced waveform, wherein said adjusting step linearly interpolates sampled values of said sampled reproduced waveform at a timing of R1 or R2 assuming a maximum, to extract times-series data of said reproduced waveform for respective clock cycles.

2. (Cancelled)

3. (Amended) The method for adjusting the recording condition of optical information according to claim 1 or 2, wherein an index of said linearity is obtained by the following formula:

$$\varepsilon = \sum_{k} (y_k - \sum_{i} a_{k-i} \times h_i)^2$$

(i being an integer satisfying $0 \leqq i \leqq m$), wherein [a_0, a_1, $\cdots$, a_k, $\cdots$,

a_{n-1}, a_n] represent said times-series data for respective said clock cycles of the clock for recording said optical recording medium, [y_0, y_1, $\cdots$, y_k, $\cdots$, y_{n-1}, y_n] represent time-series data of said reproducing waveform for respective said clock cycles (n being an integer not smaller than zero, and k being an integer satisfying $0 \leqq k \leqq n$), and [h_0, h_1, $\cdots$, h_m] represent pulse responses of a recording/reproducing system corresponding to a specific recording/reproducing condition (m being an integer satisfying $15 \leqq m \leqq n$).

4. (Amended) A method for adjusting a recording condition of optical information, comprising the steps of: irradiating an optical recording medium with laser light having a recording pulse waveform generated based on a recording signal, which is in synchrony with clock cycles, to form a record mark group on said optical recording medium; reading said record mark group to obtain a reproduced waveform, and adjusting a recording condition by evaluating a linearity of said reproduced waveform, characterized in that:

said adjusting step is such that an index of the linearity is obtained by the following formula:

$$R1 = (n+1) \times \frac{\sum_i h_i^2}{\sum_k (y_k - \sum_i a_{k-1} \times h_i)^2}$$

(i being an integer satisfying $0 \leqq i \leqq m$), wherein [a_0, a_1, $\cdots$, a_k, $\cdots$, a_{n-1}, a_n] represent said times-series data for respective said clock

cycles of the clock for recording said optical recording medium, [y_0, y_1, $\cdots$, y_k, $\cdots$, y_{n-1}, y_n] represent time-series data of said reproducing waveform for respective said clock cycles (n being an integer not smaller than zero, and k being an integer satisfying $0 \leqq k \leqq n$), and [h_0, h_1, $\cdots$, h_m] represent pulse responses of a recording/reproducing system corresponding to a specific recording/reproducing condition (m being an integer satisfying $15 \leqq m \leqq n$).

5. (Amended) A method for adjusting a recording condition of optical information, comprising the steps of: irradiating an optical recording medium with laser light having a recording pulse waveform generated based on a recording signal, which is in synchrony with clock cycles, to form a record mark group on said optical recording medium; reading said record mark group to obtain a reproduced waveform, and adjusting the recording condition by evaluating a linearity of said reproduced waveform, characterized in that:

said adjusting step is such that an index of the linearity is obtained by the following formula:

$$R2 = \frac{\sum_k y_k^{\,2}}{\sum_k (y_k - \sum_i a_{k-1} \times h_i)^2}$$

(i being an integer satisfying $0 \leqq i \leqq m$), wherein [a_0, a_1, $\cdots$, a_k, $\cdots$, a_{n-1}, a_n] represent said times-series data for respective said clock cycles of the clock for recording on said optical recording medium, [y_0,

$y_1, \cdots, y_k, \cdots, y_{n-1}, y_n]$ represent time-series data of said reproducing waveform for respective said clock cycles (n being an integer not smaller than zero), and k being an integer satisfying $0 \leqq k \leqq n$), and $[h_0, h_1, \cdots, h_m]$ represent pulse responses of a recording/reproducing system corresponding to a specific recording/reproducing condition (m being an integer satisfying $15 \leqq m \leqq n$).

6. (Amended) The method for adjusting the recording condition of optical information according to claim 4 or 5, wherein said adjusting step includes the steps of sampling said reproduced waveform at a period shorter than a clock period, and extracting time-series data of said reproduced waveform for respective said clock cycles by linearly interpolating sampled values of said sampled reproduced waveform at a timing of said R1 or R2 assuming a maximum.

7. The method for adjusting the recording condition of optical information according to any one of claims 1 to 6, wherein said optical recording medium is a phase-change optical recording medium, and wherein, upon forming said record mark group on said phase-change optical recording medium by irradiating said phase-change optical recording medium with the laser light, an overwrite operation is conducted twice before obtaining said reproduced waveform.

8. (Amended) The method for adjusting the recording condition of

optical information according to any one of claims 1 to 7, wherein three or more of said record mark groups are recorded using recording pulse waveforms having the same form, said record mark groups are reproduced to sample three or more reproduced waveforms, and samples values of said sampled reproduced waveforms are averaged.

9. The method for adjusting the recording condition of optical information according to any one of claims 1 to 7, wherein said record mark group is recorded by using a single recording pulse having a specific waveform, and said record mark group is reproduced for three or more times to sample three or more reproduced waveforms, and sampled values of said sampled reproduced waveforms are averaged.

10. The method for adjusting the recording condition of optical information according to 8, wherein said three or more record mark groups are formed on a single track of said optical recording medium.

11. (Cancelled)

12. The method for adjusting the recording condition of optical information according to claim 4, wherein said R1 is adjusted so as to satisfy $10 \times \log R1 > 20\text{-}20(l/w)$ dB, given "w" being a beam diameter of the laser beam used for recording/reproducing information, given "l" being a shortest mark length to be recorded on the optical-information recording medium.

13. The method for adjusting the recording condition of optical information according to claim 5, wherein said R2 is adjusted so as to satisfy $10 \times \log R2 > 21\text{-}20(l/w)$ dB, given "w" being a beam diameter of the laser beam used for recording/reproducing information, given "l" being a shortest mark length to be recorded on the optical-information recording medium.

14. (Amended) The method for adjusting the recording condition of optical information according to claim 3, 4, 5, 6, 12 or 13, wherein said h_i has a value determined using a least-squares method, and has a non-zero width larger than 15T, given T being a reference clock of data.

15. (Cancelled)

16. The method for adjusting the recording condition of optical information according to any one of claims 1 to 15, wherein, when the data recorded on said optical information recording medium are expressed by "1" or "0", a reference data is added before said recording signal as a reference timing for sampling said reproduced waveform, said reference data having a duration of data "1" or data "0" different from the width of said recording signal.

17. (Amended) A recording/reproducing apparatus for optical information, comprising:

an optical head irradiating an optical recording medium with laser light to receive reflected light therefrom;

a laser drive for changing an optical intensity of an laser output thereof; and

a control section having the functions of: converting a recording signal, which is in synchrony with clock cycles, into a recording pulse waveform to transmit the same to said laser drive; sampling a reproduced waveform, reproduced from record marks on said optical recording medium, at a period shorter than a clock period; interpolating the sampled values; evaluating a difference between a waveform obtained by convolution of pulse responses determined from said reproduced waveform and said recording signal and a waveform obtained by sampling said reproduced waveform and interpolating sampled values thereof at a timing of R1 or R2 assuming a maximum, to adjust a width or power of said recording pulse waveform.

18. (Amended) The recording/reproducing apparatus according to claim 17, wherein said evaluating is such that at least one of the following formulas:

$$\varepsilon = \sum_{k} (y_k - \sum_{i} a_{k-i} \times h_i)^2 \quad ;$$

$$R1 = (n+1) \times \frac{\sum_i h_i^2}{\sum_k (y_k - \sum_i a_{k-1} \times h_i)^2}$$; and

$$R2 = \frac{\sum_k y_k^2}{\sum_k (y_k - \sum_i a_{k-1} \times h_i)^2}$$

(i being an integer satisfying $0 \leqq i \leqq m$), wherein $[a_0, a_1, \cdots, a_k, \cdots, a_{n-1}, a_n]$ represent said times-series data for respective said clock cycles of the clock for recording said optical recording medium, $[y_0, y_1, \cdots, y_k, \cdots, y_{n-1}, y_n]$ represent time-series data of said reproducing waveform for respective said clock cycles (n being an integer not smaller than zero, and k being an integer satisfying $0 \leqq k \leqq n$), and $[h_0, h_1, \cdots, h_m]$ represent pulse responses of a recording/reproducing system corresponding to a specific recording/reproducing condition (m being an integer satisfying $15 \leqq m \leqq n$),

are defined and a resultant value therefrom is evaluated to adjust said recording condition.

19. The recording/reproducing apparatus according to claim 17 or 18, wherein said optical recording medium is a phase-change optical recording medium, and wherein, upon forming said record mark group on said phase-change optical recording medium by irradiating said phase-change optical recording medium with the laser light, an overwrite operation is conducted twice or more before obtaining said reproduced waveform.

20. (Amended) The recording/reproducing apparatus according to claim 15 or 16, wherein a function of obtaining said reproduced signal includes the function of averaging three or more reproduced waveforms obtained by reproducing a plurality of record mark groups recorded by a plurality of recording pulses having the same waveform, or the function of averaging thee or more reproduced waveforms obtained by reproducing for a plurality of times a mark group recorded by a specified recording pulse waveform.

21. The recording/reproducing apparatus according to claim 18, wherein said control section controls said recording condition by defining the following formula:

$$R1 = (n+1) \times \frac{\sum_i h_i^2}{\sum_i (y_k - \sum_i a_{k-1} \times h_i)^2} \quad ,$$

and said control section further has a function of determining a recording or erasing laser power so as to satisfy $10 \times \log R1 > 20\text{-}20(l/w)$ dB, given w being a beam diameter of the laser beam, given l being a shortest mark length among said record mark group.

22. The recording/reproducing apparatus according to claim 18, wherein said control section controls said recording condition by defining the following formula:

$$R2 = (n+1) \times \frac{\sum_k y_k^{\,2}}{\sum_k (y_k - \sum_k a_{k-1} \times h_i)^2},$$

and said control section further has a function of determining a recording or erasing laser power so as to satisfy $10 \times \log R2 > 21\text{-}20(l/w)$ dB, given w being a beam diameter of the laser beam, given l being a shortest mark length among said record mark group.

23. The recording/reproducing apparatus using the method for adjusting the recording condition of recording information, according to any one of claims 1 to 16.